PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of

Jean-Marc KASBARIAN et al. Attn: PCT Branch

Application No. New U.S. National Stage of PCT/FR03/00709

Filed: August 24, 2004 Docket No.: 120851

For: METHOD OF DAMPING THE PARASITIC VIBRATIONS COMING FROM THE FRONT AXLE ASSEMBLY OF A MOTOR VEHICLE

TRANSLATION OF THE ANNEXES TO THE INTERNATIONAL PRELIMINARY EXAMINATION REPORT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Attached hereto is a translation of the annexes to the International Preliminary Examination Report (Form PCT/IPEA/409). The attached translated material replaces the material in the specification on pages 3 through 4 and the claims.

Respectfully submitted,

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- processing said signal so as to isolate its component that is the image of the parasitic vibrations;
- calculating, from the parasitic component thus isolated, a correction current for correcting the aforementioned setpoint current; and
- applying the calculated correction current to the setpoint current, determined by taking other parameters into account, in order to control the electric power-steering motor.

Thus, the method forming the subject of the invention makes it possible to "erase" the parasitic vibrations transmitted to the steering system and to restore the driving comfort, the invention being based on the observation that a simple suitable corrective action, exerted by the electric power steering, allows the parasitic vibrations coming from the front axle assembly to be damped. The simplicity and the low cost of the solution proposed by the invention should be noted, which invention requires no additional sensor, makes use of the possibilities afforded by a computer already existing on any vehicle fitted with electric power steering and, finally, corrects the parasitic vibrations only by modulating the power-assisted torque exerted on the steering system.

The electrical signal, in voltage or current form, used here in the computer owing to the fact that it "contains" the parasitic component, is for example the speed of the electric power-steering motor or the time derivative of a detected torque.

The processing of this signal, for the purpose of isolating its component that is the image of the parasitic vibrations to be damped, is advantageously a filtering that lets through the high-frequency component or components and that eliminates however, from this signal, the low-frequency component or

components, especially those that are imposed by the driver of the vehicle in question.

The calculation of the correction current, from the isolated parasitic component, may also take into account at least one other parameter, such as for example the speed of the vehicle. This parameter-assigned calculation may be a simple multiplication by a variable "gain", which depends for example on the speed of the vehicle. It may also be a more complex calculation, of the "transfer function" kind.

As regards the final application of the correction current, thus calculated, to the setpoint current, this may be a simple subtraction of the correction current from the setpoint current determined on the basis of other parameters, so as to deliver, as a result of this subtraction, the

CLAIMS

1. A method of damping parasitic vibrations coming from the front axle assembly of a motor vehicle fitted with electric power steering, using a power-steering electric motor (1) controlled by an electronic computer that delivers an electrical setpoint current, taking into account various parameters, from which the power current of the power-steering electric motor is established, the damping method consisting essentially in:

- having available in the computer an electrical signal (ω) which possesses a component (ωf) that is the image of the parasitic vibrations coming from the front axle assembly of the vehicle;
- processing said signal (ω) so as to isolate its component (ωf) that is the image of the parasitic vibrations;
- calculating, from the parasitic component (ωf) thus isolated, a correction current (Ic) for correcting the aforementioned setpoint current; and
- applying the calculated correction current (Ic) to the setpoint current (I), determined by taking other parameters into account, in order to control the electric power-steering motor.

2. The method as claimed in claim 1, characterized in that the electrical signal, used in the computer as signal "containing" the parasitic component, is the speed (ω) of the power-steering electric motor.

3. The method as claimed in claim 1, characterized in that the electrical signal, used in the computer as signal "containing" the parasitic component, is the time derivative of a detected torque.

4. The method as claimed in any one of claims 1 to 3, characterized in that the processing of the

aforementioned signal (ω), for the purpose of isolating its component that is the image of the parasitic vibrations to be damped, is a filtering (F) that lets through the high-frequency component or components and that eliminates however, from this signal, the low-frequency component or components, especially those that are imposed by the driver of the vehicle in question.

5. The method as claimed in any one of claims 1 to 4, characterized in that the calculation of the correction current (Ic), from the isolated parasitic component (ωf), also takes into account at least one other parameter (V).

6. The method as claimed in claim 5, characterized in that said other parameter is the speed (V) of the vehicle.

7. The method as claimed in claim 5 or 6, characterized in that a parameter-assigned calculation of the correction current (Ic) is a multiplication by a variable "gain" (K), this being a function for example of the speed (V) of the vehicle.

8. A method as claimed in claim 5 or 6, characterized in that the parameter-assigned calculation of the correction current (Ic) is a calculation of the "transfer function" kind.

9. The method as claimed in any one of claims 1 to 8, characterized in that the final application of the calculated correction current to the setpoint current is a subtraction of the correction current (Ic) from the setpoint current (I) determined on the basis of other parameters, so as to deliver, as a result of this subtraction, the final setpoint current (It), which, when transformed into a control current (Ip), will control the electric power steering by correcting the

vibrations coming from the front axle assembly of the vehicle.